

AGRICULTURAL MECHANICS TECHNOLOGY STANDARDS



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All Nevadans ready for success in the 21st century

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*To improve student achievement and educator effectiveness by ensuring opportunities,
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BUSINESS AND INDUSTRY VALIDATION

All CTE standards developed through the Nevada Department of Education are validated by business and industry through one or more of the following processes: (1) the standards are developed by a team consisting of business and industry representatives; or (2) a separate review panel was coordinated with industry experts to ensure the standards include the proper content; or (3) the adoption of nationally-recognized standards endorsed by business and industry.

The Agricultural Mechanics Technology standards were validated through a complete review by an industry panel.

PROJECT COORDINATOR

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AGRICULTURE AND NATURAL RESOURCES

Program Requirements

Occupations associated with agriculture production, natural resources, processing and distribution of food and fiber are important to the national interests and provide significant employment opportunities. Occupational education and training in agriculture and agri-business are essential to the continued economic health of Nevada and the nation, as it provides the needed competent and trained work force.

Agriculture education provides high school students with technical and specialized knowledge in production agriculture and natural resources as well as other specific agriculture occupations. The programs are designed to meet students' occupational objectives, interests, and abilities for entry into chosen occupations and can prepare them for advanced education and training. Agriculture education is a coordinated program of group and individual instructional activities consisting of classroom instruction, laboratory experiences, and leadership development. Integral to these activities are FFA (leadership development) and Supervised Agricultural Experience (work-based learning), Nevada Revised Statute 385.110. Federal/Public law#105-225 which was passed in August, 1998, states "Congress of the United States recognizes the importance of the FFA as an integral part of the program of Vocational Agriculture." All students enrolled in Agriculture Education will be recognized as members of the FFA organization. All secondary agriculture education programs and school districts will purchase a curriculum packet consisting of the New Horizons agriculture career and technical magazine, the FFA manual, and the Nevada Record Book on a yearly basis for every student enrolled in agriculture education in their program. Areas of study at the secondary level are divided into Agriculture Science and Specialized Advanced Agriculture Career and Technical Areas.

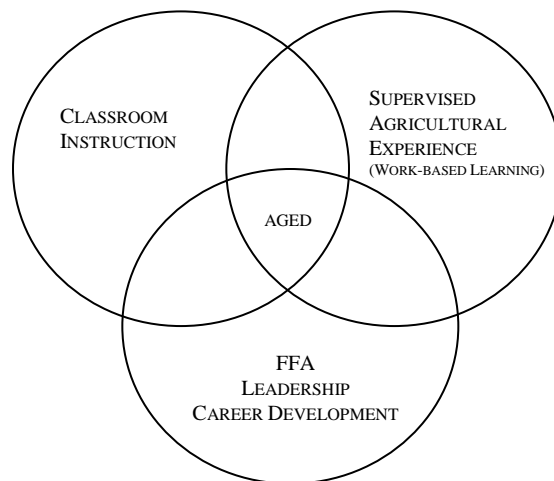
Agriculture and Society, Plant and Soil Science, Agricultural Mechanics Technology, Animal Science, Leadership/FFA, Agriculture Business, Sales, Marketing and Supervised Agricultural Experience, Natural Resources, and Employability are included in the Agriculture Science introduction division.

Instruction in business/specialized agriculture provides training in specific occupational skills, duties, and tasks, as determined by the business and industry needs. Specialized career and technical agriculture programs will include, but are not limited to, the following: ornamental horticulture, floriculture design, turf and landscape management, equine science and technology, forestry technology, wildlife management and enforcement, food science and processing, feedlot management, animal science, veterinary science, agriculture power systems, natural resources and reclamation, mining science and operations, nursery and greenhouse management, landscape architecture, irrigation and chemical management, lawn care and maintenance, and agriculture construction.

NEVADA

AGRICULTURE EDUCATION

School Based Model of Instruction



INTRODUCTION

The standards in this document are designed to clearly state what the student should know and be able to do upon completion of an advanced high school Agricultural Mechanics Technology program. These standards are designed for a three-credit course sequence that prepares the student for a technical assessment directly aligned to the standards.

These exit-level standards are designed for the student to complete all standards through their completion of a program of study. These standards are intended to guide curriculum objectives for a program of study.

The standards are organized as follows:

Content Standards are general statements that identify major areas of knowledge, understanding, and the skills students are expected to learn in key subject and career areas by the end of the program.

Performance Standards follow each content standard. Performance standards identify the more specific components of each content standard and define the expected abilities of students within each content standard.

Performance Indicators are very specific criteria statements for determining whether a student meets the performance standard. Performance indicators may also be used as learning outcomes, which teachers can identify as they plan their program learning objectives.

The crosswalk and alignment section of the document shows where the performance indicators support the Nevada Academic Content Standards in Science (based on the Next Generation Science Standards) and the English Language Arts and Mathematics (based on the Common Core State Standards). Where correlation with an academic content standard exists, students in the Agricultural Mechanics Technology program perform learning activities that support, either directly or indirectly, achievement of the academic content standards that are listed.

All students are encouraged to participate in the career and technical student organization (CTSO) that relates to their program area. CTSOs are co-curricular national associations that directly enforce learning in the CTE classroom through curriculum resources, competitive events, and leadership development. CTSOs provide students the ability to apply academic and technical knowledge, develop communication and teamwork skills, and cultivate leadership skills to ensure college and career readiness.

The Employability Skills for Career Readiness identify the “soft skills” needed to be successful in all careers, and must be taught as an integrated component of all CTE course sequences. These standards are available in a separate document.

The **Standards Reference Code** is only used to identify or align performance indicators listed in the standards to daily lesson plans, curriculum documents, or national standards.

Program Name	Standards Reference Code
Agricultural Mechanics Technology	AMT

Example: AMT.2.3.4

Standards	Content Standard	Performance Standard	Performance Indicator
Agricultural Mechanics Technology	2	3	4

CONTENT STANDARD 1.0 : DEMONSTRATE GENERAL SHOP SAFETY PROCEDURES

PERFORMANCE STANDARD 1.1 : UNDERSTAND PERSONAL AND GROUP SAFETY

- | | |
|-------|---|
| 1.1.1 | Demonstrate personal safety precautions in an agricultural mechanics environment |
| 1.1.2 | Describe group safety precautions in an agricultural mechanics environment, including lock out/tag out procedures |
| 1.1.3 | Identify safe and unsafe working conditions in the agricultural mechanics environment |
| 1.1.4 | Distinguish between the different types of fires |
| 1.1.5 | Classify the three components of the fire triangle |
| 1.1.6 | Describe the different types of fire extinguishers |
| 1.1.7 | Demonstrate appropriate fire extinguisher use |
| 1.1.8 | Identify general shop housekeeping procedures |

CONTENT STANDARD 2.0 : DEMONSTRATE SAFE AND PROPER WELDING PROCEDURES
PERFORMANCE STANDARD 2.1 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN OXY/FUEL CUTTING (OFC)

- | | |
|-------|---|
| 2.1.1 | Demonstrate proper safety practices while operating all welding and cutting equipment |
| 2.1.2 | Select appropriate welding and cutting tips for specific applications |
| 2.1.3 | Properly assemble oxy/fuel apparatus |
| 2.1.4 | Properly diagnose equipment failure |
| 2.1.5 | Properly cut mild steel to specification |

PERFORMANCE STANDARD 2.2 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN SHIELDED METAL ARC WELDING (SMAW)

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|-------|--|
| 2.2.1 | Demonstrate proper safety practices while operating SMAW equipment |
| 2.2.2 | Select appropriate electrodes for specific applications |
| 2.2.3 | Properly adjust SMAW apparatus |
| 2.2.4 | Properly diagnose equipment failure |
| 2.2.5 | Produce three AWS standard welds in the flat and horizontal position |
| 2.2.6 | Identify welding electrodes using AWS electrode classification system |
| 2.2.7 | Determine the correct shade of lens used for a given application and type of welding process |

PERFORMANCE STANDARD 2.3 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN GAS METAL ARC WELDING (GMAW)

- | | |
|-------|---|
| 2.3.1 | Demonstrate proper safety practices while operating GMAW equipment |
| 2.3.2 | Select appropriate electrodes, contact tips, gas nozzles and diffusers, and shielding gas for specific applications |
| 2.3.3 | Properly adjust GMAW apparatus for specific application |
| 2.3.4 | Properly diagnose equipment failure |
| 2.3.5 | Produce three AWS standard welds in the flat and horizontal position |

PERFORMANCE STANDARD 2.4 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN GAS TUNGSTEN ARC WELDING (GTAW)

- | | |
|-------|--|
| 2.4.1 | Demonstrate proper safety practices while operating GTAW equipment |
| 2.4.2 | Select appropriate consumables and shielding gas for specific applications |
| 2.4.3 | Properly adjust GTAW apparatus for specific application |
| 2.4.4 | Properly diagnose equipment failure |
| 2.4.5 | Produce three AWS standard welds in the flat and horizontal position on ferrous metals |

PERFORMANCE STANDARD 2.5 : DEMONSTRATE SAFE AND PROPER TECHNIQUES IN PLASMA CUTTING (PAC) PROCEDURES

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|-------|--|
| 2.5.1 | Demonstrate proper safety practices while operating plasma cutting equipment |
| 2.5.2 | Select appropriate consumables for specific applications |
| 2.5.3 | Properly assemble plasma cutting apparatus |
| 2.5.4 | Properly diagnose equipment failure |
| 2.5.5 | Properly cut ferrous metals |

CONTENT STANDARD 3.0 : UNDERSTAND THE PRINCIPLES OF ELECTRICITY IN AGRICULTURE**PERFORMANCE STANDARD 3.1 : UNDERSTAND PRINCIPLES AND THEORIES OF ELECTRICITY**

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|-------|---|
| 3.1.1 | Describe proper safety practices applicable to agricultural electrification |
| 3.1.2 | Describe the principles of generation, transmission and distribution of electricity |
| 3.1.3 | Describe voltage, current, and resistance |
| 3.1.4 | Differentiate between direct and alternating current |

PERFORMANCE STANDARD 3.2 : APPLY THE PRINCIPLES AND THEORIES OF ELECTRICAL CIRCUITS

- | | |
|-------|---|
| 3.2.1 | Determine the proper conductor for specific applications |
| 3.2.2 | Explain the function of circuit breakers and overcurrent protection devices |
| 3.2.3 | Explain the function and importance of grounding in electrical circuits |
| 3.2.4 | Use the multimeter to measure voltage, current, and resistance |

CONTENT STANDARD 4.0 : UNDERSTAND WATER AND WASTEWATER MANAGEMENT IN AGRICULTURAL AND INDUSTRIAL SETTINGS

PERFORMANCE STANDARD 4.1 : DEMONSTRATE SAFE PRACTICES AND PROCEDURES IN AGRICULTURAL AND INDUSTRIAL WATER MANAGEMENT

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|-------|---|
| 4.1.1 | Explain the role of water use, management and conservation in the agricultural industry |
| 4.1.2 | Select and use safety equipment appropriate to working conditions |

PERFORMANCE STANDARD 4.2 : DEMONSTRATE BASIC PIPE FITTING SKILLS

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|-------|---|
| 4.2.1 | Describe how to select and identify fittings and pipe |
| 4.2.2 | Describe how to measure, mark, cut, ream, thread, and join pipe |

CONTENT STANDARD 5.0 : UNDERSTAND PRINCIPLES AND APPLICATIONS IN AGRICULTURAL CONSTRUCTION**PERFORMANCE STANDARD 5.1 : DEMONSTRATE PRACTICES, APPLICATIONS AND PROCEDURES OF DRAFTING IN AGRICULTURAL PROJECTS**

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|-------|---|
| 5.1.1 | Differentiate between the various plans used in projects (blueprints, shop plans and wiring schematics) |
| 5.1.2 | Draw basic plans using proper drafting techniques |
| 5.1.3 | Develop a bill of materials from a selected set of plans |

PERFORMANCE STANDARD 5.2 : DEMONSTRATE PRACTICES AND PROCEDURES IN CONSTRUCTION OF AGRICULTURAL PROJECTS

- | | |
|-------|---|
| 5.2.1 | Explain safety procedures required while working on a project site, including personal safety, hand and power tools and equipment |
| 5.2.2 | Select appropriate design, type and materials to meet the building needs while considering use, environment and budget |

CONTENT STANDARD 6.0 : UNDERSTAND PRINCIPLES AND APPLICATIONS OF SINGLE AND MULTIPLE CYLINDER ENGINES

PERFORMANCE STANDARD 6.1 : DEMONSTRATE SAFE PRACTICES AND PROCEDURES OF THE OPERATION, MAINTENANCE AND REPAIR OF SMALL GAS ENGINES AND EQUIPMENT

- | | |
|-------|---|
| 6.1.1 | Describe personal and environmental safety practices associated with the operation, maintenance and repair of small gas engines and equipment |
| 6.1.2 | Describe personal and environmental safety practices associated with the operation, maintenance and repair of gas and diesel power as applied to agricultural equipment |

PERFORMANCE STANDARD 6.2 : DEMONSTRATE A WORKING KNOWLEDGE OF THE ESSENTIAL ENGINE OPERATING SYSTEMS

- | | |
|-------|--|
| 6.2.1 | Classify small gas engines according to ignition, fuel, cooling, lubrication and compression systems |
| 6.2.2 | Explain functions of ignition, fuel, cooling, lubrication and compression systems and their interrelationships |

PERFORMANCE STANDARD 6.3 : RECOGNIZE APPROPRIATE POWER ATTACHMENTS AND THEIR APPLICATIONS

- | | |
|-------|---|
| 6.3.1 | List and describe appropriate uses and applications of small engine attachments |
| 6.3.2 | Explain the various methods of connecting attachments to small engines |

PERFORMANCE STANDARD 6.4 : DEMONSTRATE MAINTENANCE AND REPAIR PROCEDURES ON SINGLE AND MULTIPLE CYLINDER ENGINES AND ATTACHMENTS

- | | |
|-------|--|
| 6.4.1 | Identify common failures relating to ignition, fuel, cooling, lubrication and compression systems and attachments |
| 6.4.2 | Interpret service manual information for small engine and equipment maintenance and repair |
| 6.4.3 | Diagnose and repair common failures relating to ignition, fuel, cooling, lubrication, electrical and compression systems |

CONTENT STANDARD 7.0 : DEMONSTRATE BASIC SKILLS IN OPERATION, MAINTENANCE AND REPAIR OF AGRICULTURAL MACHINERY**PERFORMANCE STANDARD 7.1 : DEMONSTRATE SAFE PRACTICES AND PROCEDURES OF OPERATION, MAINTENANCE AND REPAIR OF AGRICULTURAL MACHINERY AND EQUIPMENT**

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|-------|---|
| 7.1.1 | Demonstrate the safety practices and procedures that must be practiced when working with agricultural machinery |
| 7.1.2 | Classify agricultural machinery according to function, type, and style |
| 7.1.3 | Explain the importance of preventive maintenance programs and keeping accurate maintenance records |
| 7.1.4 | Prepare an applicable piece of equipment for storage |
| 7.1.5 | Determine the cost of routine equipment maintenance |
| 7.1.6 | Repair common failures relating to agricultural machinery by utilizing repair and parts manuals |
| 7.1.7 | Perform manufacturers recommended pre-operation safety inspection |

CONTENT STANDARD 8.0 : IDENTIFY AND DEMONSTRATE THE PROPER USE OF AGRICULTURAL HAND AND POWER TOOLS

PERFORMANCE STANDARD 8.1 : IDENTIFY GENERAL SHOP HAND AND POWER TOOLS

8.1.1	Identify and explain the safe and proper use of shop hand and power tools
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PERFORMANCE STANDARD 8.2 : DEMONSTRATE APPROPRIATE PROCEDURES FOR THE MAINTENANCE AND REPAIR OF HAND TOOLS

8.2.1	Determine if the tool can be safely used in its present condition or, if damaged, reconditioned/replaced
8.2.2	Demonstrate proper care and storage of tools
8.2.3	Repair a damaged tool to a safe working condition

CONTENT STANDARD 9.0 : DEMONSTRATE THE OPERATION, MAINTENANCE AND USE OF ELECTRICAL POWER, MOTORS AND CONTROLS IN AGRICULTURAL APPLICATIONS**PERFORMANCE STANDARD 9.1 : DEMONSTRATE PROCEDURES ASSOCIATED WITH THE OPERATION, MAINTENANCE AND REPAIR OF ELECTRICAL POWER**

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|-------|---|
| 9.1.1 | Recognize possible safety hazards while working with electrical motors and controls |
| 9.1.2 | Select and properly use safety equipment appropriate to working conditions |
| 9.1.3 | Explain the function of various controls used in electrical applications |
| 9.1.4 | Demonstrate a working knowledge of repair manuals and parts manuals |
| 9.1.5 | Diagnose and repair common failures relating to electrical motors and controls |

CONTENT STANDARD 10.0 : UNDERSTAND AGRICULTURAL HYDRAULIC SYSTEMS

PERFORMANCE STANDARD 10.1 : DEMONSTRATE KNOWLEDGE OF THE BASIC PRINCIPLES, OPERATION AND MAINTENANCE OF HYDRAULIC SYSTEMS IN THE AGRICULTURAL INDUSTRY

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|--------|--|
| 10.1.1 | Identify essential safety practices relating to the operation of agricultural equipment using hydraulics |
| 10.1.2 | Explain the four basic principles of hydraulics |
| 10.1.3 | Describe the functions and relationships of the basic components of a hydraulic system |
| 10.1.4 | Perform routine service and maintenance utilizing appropriate service manuals |
| 10.1.5 | Identify problems associated with hydraulic systems |

CONTENT STANDARD 11.0 : DESCRIBE THE RELATIONSHIP BETWEEN A SUPERVISED AGRICULTURAL EXPERIENCE (SAE) AND PREPARATION OF STUDENTS FOR A CAREER IN AGRICULTURE

PERFORMANCE STANDARD 11.1 : ACTIVELY DEVELOP AND PARTICIPATE IN SUPERVISED AGRICULTURAL EXPERIENCE, WHICH ENABLES STUDENTS TO OBTAIN WORK-BASED SKILLS

- | | |
|--------|--|
| 11.1.1 | Identify and describe a career interest in agriculture or agriculture related occupation |
| 11.1.2 | Participate in and manage their individual Supervised Agricultural Experience |
| 11.1.3 | Keep accurate records as prescribed by the Nevada State FFA policies and procedures |

CONTENT STANDARD 12.0 : PARTICIPATE IN LEADERSHIP TRAINING THROUGH MEMBERSHIP IN FFA

PERFORMANCE STANDARD 12.1 : RECOGNIZE THE TRAITS OF EFFECTIVE LEADERS AND PARTICIPATE IN LEADERSHIP TRAINING THROUGH INVOLVEMENT IN FFA

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|--------|--|
| 12.1.1 | Recognize opportunities in high-wage, high-skill careers in leadership and communications |
| 12.1.2 | Explain the FFA creed, motto, salute, and FFA Mission Statement |
| 12.1.3 | Demonstrate knowledge of the history of the organization, the chapter constitution and bylaws, and the chapter program of activities |
| 12.1.4 | Demonstrate knowledge of the FFA Code of Ethics, official dress, and the proper use of the FFA jacket |
| 12.1.5 | Describe the meaning of the FFA colors |

PERFORMANCE STANDARD 12.2 : UNDERSTAND THE OPPORTUNITIES IN FFA

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|--------|--|
| 12.2.1 | Describe how FFA develops leadership skills, personal growth, and career success |
| 12.2.2 | Identify major state and national activities and awards available to FFA members |
| 12.2.3 | Participate in at least one Career Development Event at the local level |

PERFORMANCE STANDARD 12.3 : UNDERSTAND THE IMPORTANCE OF SCHOOL AND COMMUNITY AWARENESS

- | | |
|--------|--|
| 12.3.1 | Discuss the meaning and importance of community service |
| 12.3.2 | Identify and describe some community service organizations |
| 12.3.3 | Explain how FFA members can become involved in community improvement and development |

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**CROSSWALKS AND ALIGNMENTS OF
AGRICULTURAL MECHANICS TECHNOLOGY STANDARDS
AND THE NEVADA ACADEMIC CONTENT STANDARDS
AND THE COMMON CAREER TECHNICAL CORE STANDARDS**

CROSSWALKS (ACADEMIC STANDARDS)

The crosswalk of the Agricultural Mechanics Technology Standards shows links to the Nevada Academic Content Standards in Science (based on the Next Generation Science Standards – Disciplinary Core Ideas Arrangement) and the English Language Arts and Mathematics (based on the Common Core State Standards). The crosswalk identifies the performance indicators in which the learning objectives in the Agricultural Mechanics Technology program support academic learning. The performance indicators are grouped according to their content standard and are crosswalked to the Nevada Academic Content Standards in Science, English Language Arts, and Mathematics.

ALIGNMENTS (MATHEMATICAL PRACTICES)

In addition to correlation with the Nevada Academic Content Standards for Mathematics, many performance indicators support the Mathematical Practices. The following table illustrates the alignment of the Agricultural Mechanics Technology Standards Performance Indicators and the Mathematical Practices. This alignment identifies the performance indicators in which the learning objectives in the Agricultural Mechanics Technology program support academic learning.

CROSSWALKS (COMMON CAREER TECHNICAL CORE)

The crosswalk of the Agricultural Mechanics Technology Standards shows links to the Common Career Technical Core. The crosswalk identifies the performance indicators in which the learning objectives in the Agricultural Mechanics Technology program support the Common Career Technical Core. The Common Career Technical Core defines what students should know and be able to do after completing instruction in a program of study. The Agricultural Mechanics Technology Standards are crosswalked to the Agriculture Food and Natural Resources Career Cluster™ and the Power, Structural and Technical Systems Career Pathway.

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**CROSSWALK OF AGRICULTURAL MECHANICS TECHNOLOGY STANDARDS
AND THE NEVADA ACADEMIC CONTENT STANDARDS**

CONTENT STANDARD 1.0: DEMONSTRATE GENERAL SHOP SAFETY PROCEDURES

Performance Indicators	Nevada Academic Content Standards
1.1.4	<u>Science: Physical Science</u> P.12.A.6 Students know chemical reactions either release or absorb energy.

CONTENT STANDARD 2.0: DEMONSTRATE SAFE AND PROPER WELDING PROCEDURES

Performance Indicators	Nevada Academic Content Standards
2.1.2	<u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.
2.1.4	<u>Science: Nature of Science</u> N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology. <u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.
2.2.2	<u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.
2.2.4	<u>Science: Nature of Science</u> N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology.
2.2.6	<u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.
2.3.2	<u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.
2.3.4	<u>Science: Nature of Science</u> N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology.
2.4.2	<u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations. <u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.
2.4.4	<u>Science: Nature of Science</u> N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology.
2.5.2	<u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.
2.5.4	<u>Science: Nature of Science</u> N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology.

CONTENT STANDARD 3.0: UNDERSTAND PRINCIPLES OF ELECTRICITY IN AGRICULTURE

Performance Indicators	Nevada Academic Content Standards
3.1.2	<p><u>Science: Physical Science</u> P.12.B.3 Students know the strength of the electric force between two objects increases with charge and decreases with distance.</p> <p><u>Science: Physical Science</u> P.12.C.1 Students know waves (i.e. sound, seismic, electromagnetic) have energy that can be transferred when the waves interact with matter.</p> <p><u>Science: Physical Science</u> P.12.C.6 Students know electricity is transferred from generating sources for consumption and practical uses.</p>
3.1.3	<p><u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.</p> <p><u>Math: Number & Quantity – Quantities</u> N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p><u>Math: Algebra – Creating Equations</u> A-CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</p> <p><u>Science: Physical Science</u> P.12.A.4 Students know atoms bond with one another by transferring or sharing electrons.</p>
3.1.4	<p><u>Science: Physical Science</u> P.12.C.2 Students know energy forms can be converted.</p>
3.2.1	<p><u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.</p>
3.2.2	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>

3.2.3	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>
3.2.7	<p><u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.</p>

CONTENT STANDARD 4.0: UNDERSTAND WATER AND WASTEWATER MANAGEMENT IN AGRICULTURAL AND INDUSTRIAL SETTINGS

Performance Indicators	Nevada Academic Content Standards
4.1.1	<p><u>Science: Earth and Space</u> E.12.C.4 Students know processes of obtaining, using, and recycling of renewable and non-renewable resources.</p> <p><u>Science: Nature of Science</u> N.12.B.2 Students know consumption patterns, conservation efforts, and cultural or social practices in countries have varying environmental impacts.</p>

CONTENT STANDARD 5.0: UNDERSTAND PRINCIPLES AND APPLICATIONS IN AGRICULTURAL CONSTRUCTION

Performance Indicators	Nevada Academic Content Standards
5.1.1	<p><u>Science: Nature of Science</u> N.12.A.1 Students know tables, charts, illustrations and graphs can be used in making arguments and claims in oral and written presentations.</p>
5.2.1	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>

CONTENT STANDARD 6.0: UNDERSTAND PRINCIPLES AND APPLICATIONS OF SINGLE AND MULTIPLE CYLINDER ENGINES

Performance Indicators	Nevada Academic Content Standards
6.1.1	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>
6.1.2	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p> <p><u>Science: Physical Science</u> P.12.A.5 Students know chemical reactions can take place at different rates, depending on a variety of factors (i.e. temperature, concentration, surface area, and agitation).</p>
6.2.2	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p> <p><u>Science: Physical Science</u> P.12.C.2 Students know energy forms can be converted.</p>

6.3.2	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p>
6.4.2	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p>
6.4.3	<p><u>Science: Nature of Science</u> N.12.A.5 Students models and modeling can be used to identify and predict cause-effect relationships.</p> <p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>

CONTENT STANDARD 7.0: DEMONSTRATE BASIC SKILLS IN OPERATION, MAINTENANCE AND REPAIR OF AGRICULTURAL MACHINERY

Performance Indicators	Nevada Academic Content Standards
7.1.3	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p> <p><u>Science: Nature of Science</u> N.12.A.2 Students know scientists maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigation.</p>
7.1.6	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p>

CONTENT STANDARD 8.0: IDENTIFY AND DEMONSTRATE PROPER USE OF AGRICULTURAL HAND AND POWER TOOLS

Performance Indicators	Nevada Academic Content Standards
8.2.1	<u>Science: Nature of Science</u> N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology.

CONTENT STANDARD 9.0: DEMONSTRATE THE OPERATION, MAINTENANCE AND USE OF ELECTRICAL POWER, MOTORS AND CONTROLS IN AGRICULTURAL APPLICATIONS

Performance Indicators	Nevada Academic Content Standards
9.1.3	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>
9.1.5	<p><u>Science: Nature of Science</u> N.12.A.4 Students know how to safely conduct an original scientific investigation using the appropriate tools and technology.</p>

CONTENT STANDARD 10.0: UNDERSTAND AGRICULTURAL HYDRAULIC SYSTEMS

Performance Indicators	Nevada Academic Content Standards
10.1.2	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p> <p><u>Science: Physical Science</u> P.12.B.1 Students know the laws of motion can be used to determine the effects of forces on the motion of objects.</p> <p><u>Math: Algebra – Creating Equations</u> A-CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</p>
10.1.3	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms and other domain –specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 text and topics.</p> <p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p>
10.1.4	<p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11 – 12 texts and topics.</p>

CONTENT STANDARD 11.0: DESCRIBE THE RELATIONSHIP BETWEEN A SUPERVISED AGRICULTURAL EXPERIENCE (SAE) AND PREPARATION OF STUDENTS FOR A CAREER IN AGRICULTURE

Performance Indicators	Nevada Academic Content Standards
11.1.1	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p> <p><u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.</p>
11.1.3	<p><u>English Language Arts: Reading Standards for Literacy in Science and Technical Subjects</u> RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.</p> <p><u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.</p>

CONTENT STANDARD 12.0: PARTICIPATE IN LEADERSHIP TRAINING THROUGH MEMBERSHIP IN FFA

Performance Indicators	Nevada Academic Content Standards
12.1.2	<u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
12.1.4	<u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
12.2.1	<u>English Language Arts: Speaking and Listening Standards</u> SL.11-12.4 Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.
12.3.3	<u>English Language Arts: Writing Standards for Literacy in Science and Technical Subjects</u> WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

**ALIGNMENT OF AGRICULTURAL MECHANICS TECHNOLOGY STANDARDS
AND THE MATHEMATICAL PRACTICES**

Mathematical Practices	Agricultural Mechanics Technology Performance Indicators
1. Make sense of problems and persevere in solving them.	2.3.4; 3.1.3; 5.1.3; 10.1.4, 10.1.5
2. Reason abstractly and quantitatively.	3.1.3; 3.2.1; 5.2.2; 7.1.5; 10.1.4
3. Construct viable arguments and critique the reasoning of others.	4.1.1
4. Model with mathematics.	4.1.1; 5.2.2; 10.1.3
5. Use appropriate tools strategically.	2.1.2, 2.1.4; 2.1.5; 2.2.2; 2.3.2; 2.4.3; 2.5.5 4.2.2; 5.1.2; 10.1.3, 10.1.4; 11.1.3
6. Attend to precision.	2.1.3, 2.1.5; 2.2.3, 2.2.5; 2.3.2, 2.3.3, 2.3.5; 2.4.3, 2.4.5 2.5.3, 2.5.5; 4.2.2; 5.1.2, 5.1.3; 7.1.5; 10.1.3; 11.1.3
7. Look for and make use of structure.	3.1.4
8. Look for and express regularity in repeated reasoning.	11.1.3

CROSSWALKS OF AGRICULTURAL MECHANICS TECHNOLOGY STANDARDS AND THE COMMON CAREER TECHNICAL CORE

Agriculture, Food and Natural Resources Career Cluster (AG)	Performance Indicators
1. Analyze how issues, trends, technologies and public policies impact systems in the Agriculture, Food & Natural Resources Career Cluster	4.1.1; 5.2.2; 12.2.3; 12.3.3
2. Evaluate the nature and scope of the Agriculture, Food & Natural Resources Career Cluster and the role of agriculture, food and natural resources (AFNR) in society and the economy.	4.1.1; 11.1.2; 12.2.3; 12.3.3
3. Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources Career Pathways.	11.1.1; 11.1.3; 12.1.1; 12.2.1
4. Examine and summarize the importance of health, safety and environmental management systems in AFNR businesses.	1.1.2; 1.1.8; 3.1.1; 3.2.3 5.2.1; 6.1.1; 7.1.3; 8.1.1 8.2.3; 9.1.2; 10.1.1
5. Ensure the presence and function of safety systems and hardware on tools and equipment	1.1.1-1.1.3; 2.1.1; 2.21 2.3.1; 2.4.1; 2.5.1; 6.1.2 7.1.1, 7.1.7; 9.1.1; 10.1.5

Power, Structural and Technical Systems Career Pathway (AG-PST)	Performance Indicators
1. Identify and use hand and power tools and equipment of service, construction and fabrication.	2.1.2, 2.1.5; 2.2.5, 2.2.6 2.3.2, 2.3.5; 2.4.5; 2.5.5 8.1.1; 8.2.1; 10.1.7
2. Design, operate and maintain mechanical equipment, structures, biological systems, land treatment, power and technology	4.1.1, 4.1.2; 4.2.1, 4.2.2, 4.2.3 5.2.1, 5.2.2; 10.1.2, 10.1.5
3. Service and repair mechanical equipment and power systems	6.1.1, 6.1.2; 7.1.6 8.2.3; 9.1.5; 10.1.4
4. Create sketches and plans of agricultural structures	5.1.1; 5.1.2
5. Examine structural requirements of materials and procedures and estimate construction cost.	5.1.3; 5.2.2
6. Identify kinds and characteristics of metal materials.	2.1.5; 2.3.2; 2.4.2; 2.5.2, 2.5.5
7. Use instruments and meters to test and monitor electrical and electronic processes.	3.1.3, 3.1.4; 3.2.1-3.2.3 9.1.3, 9.1.5
8. Prepare and/or use electrical drawings to design, install, and troubleshoot control systems.	3.1.2; 3.2.1, 3.2.3; 5.1.1